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ABSTRACT

The COMPIC Development Association, an organization based in Victoria, Australia, has developed techniques for publishing pictographic materials for use by individuals with severe communication impairments. The COMPIC (Computer Pictographs for Communication) system comprises a method of electronically publishing customized communication aids and educational materials without requiring photocopying or purchasing of pre-prepared materials. Software for the system is compatible with the Apple IIe, the Apple II GS, the IBM PC, and IBM-compatible computers. Teaching cards and a manual have been published to accompany the system. In lieu of purchasing the software, materials may be purchased from the Association. Over 1000 pictographs have been made available as customized layouts in various sizes, colors, and with or without adhesive backing. The vocabulary items have been color-coded in a descriptive, grammatical breakdown. This report offers a rationale for the project, describes steps in project development, discusses selection and design of the pictographs, addresses considerations in software design, and outlines project plans. (JDD)

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COMPIC -

HOW TO CREATE AND ORDER PERSONALIZED COMMUNICATION LAYOUTS FOR YOUR CLIENTS

AUTHORS: JOHANNA SNELLEMAN AND LOUISE DUNNE

Paper presented for the Australian Association of Speech and Hearing Annual Conference, Brisbane, Queensland - May 18th - Afternoon Session.

COMPIC Development Association is a multi organizational project based in Victoria and comprises speech pathologist from a range of clinical backgrounds, a graphic designer (CAPS) Computer Aided Publishing Systems, and an educational technologist from Swinburne Institute of Technology, Melbourne, Victoria. The three principal objectives of the project have been:

- to design a standardized set of pictographs for use by a diverse group of people who have severe communication impairment;
- to develop a technique of publishing of pictographic materials for various communication and education purposes;
- to increase the availability of high quality, inexpensive materials for use by people who have severe communication impairment and/or learning disability.

The COMPIC Development Association - Phase I:

This phase involved the production of a set of 580 pictographs for communication and educational purposes, a software program which enabled electronic publishing of the pictographs, and a manual which introduced the users to the pictographs and their use, the software and how to run it.

In conjunction with this, a COMPIC manual to enable parents, teachers, and therapists to design their own communication layouts was produced. At the same time a set of teaching cards of each of the COMPIC pictographs was published.

COMPIC Development Association - Phase II:

This phase is currently under way and consists of an expansion of the pictographic vocabulary to approximately 1200 items, the development of self-adhesive materials to increase the range of applications and environments in which the pictographs can be used, and refinement of the software to increase speed and flexibility. At a later stage this phase will also involve design and production of packaging items (plastic sleeves for personalized communication layouts, filed and categorized boxes for teaching cards, etc.).

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Why was the project needed?

In November, 1982, Victorian speech pathologists working in the area of severe communication impairment recognised the importance of supervising development of pictograph design, as well as production, in a planned and cost effective manner. Prior to November, 1982, pictographs were designed and circulated by speech pathologists from the Spastic Society of Victoria.

The group that formed in November of 1982 called itself the Victorian Symbol Standardization Committee and its principal objectives were to review symbol design and clinical issues relating to the use of symbols.

In addition to this, several other issues had to be considered. They were:

- provision of pictographic materials for adults which did not look childish and undignified, (the dignity of adults who have communication skills and needs, but who have severe and multiple disabilities, is often either ignored or compromised.)

  and

- production of personalised communication and teaching aids. The group felt it important that the needs of each communication aid user be recognised and reflected in individualised materials.

The time consuming task of producing these materials by people who often had limited graphic abilities or time and resources, resulted in restricted availability and unsatisfactory quality of pictographs. It was important that pictographs could be reproduced inexpensively. Traditional printing and colour photocopying were both expensive and inflexibile.

It is important to remember that although other sets of pictographs for communication do exist, the intent of COMPIC was unique; that is it was a method of electronically publishing personalized communication aids and educational materials and did not require photocopying or purchase of pre-prepared materials.

It is interesting to know that in the history of the development of COMPIC, one of the people who was involved in the manual production of pictographs was a mother who made individualised teaching materials for her son at home. Whilst at home, copying drawings on to large cards and into books, her husband queried the time-consuming effort and offered to speak with a colleague at Swinburne Institute of Technology. He enlisted the assistance of a senior lecturer in educational technology who spoke to the manager of the Graphic Design Centre and officially the project was "born". The link between the Swinburne Institute of Technology team, which provided the technological and the graphic expertise, and the Victorian Symbol Standardization Committee, which lent a considerable amount of varied clinical experience, enabled the project to achieve the Stage I objectives. The Victorian Symbol Standardization Committee comprised representatives from:

- Spastic Society of Victoria
- Yooralla Society of Victoria
- Ministry of Education (formerly, Education Department)
- Royal Children's Hospital
- Office of Intellectual Disability Services (formerly Mental Retardation Division, Health Commission).

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Stage I of the project has taken approximately 4 years to complete. Some of the factors which contributed to lengthy delays were, difficulties with the technology and the fact that this project involved busy people working on COMPIC in addition to existing heavy work loads. At times, coordinating the varied input from members of an interdisciplinary team and also coming to a consensus, also delayed the process.

COMPIC Phase I:

The individual steps in Phase I will be discussed separately:

(1) Defining the objectives of the project.

These objectives have been presented in the foregoing introduction; it is interesting to note that the objective concerning the development of an electronic publishing technique was primarily due to the computer related expertise of the Swinburne Institute of Technology team members.

(2) Investigation of equipment which could satisfactorily meet the criteria outlined in the objectives.

As mentioned earlier, equipment was identified which could produce high quality, flexible materials.

The standard set of equipment changed as the project developed. A basic set of equipment which enables publishing of COMPIC pictographs includes:

. Apple IIc or IIe microcomputer
. Hewlett Packard 7475 6-pen plotter (which differs considerably from standard printers in its use of felt pens for drafting purposes).
. Dual double disk drive.
. Apple Hard Disk unit (e.g. profile - 10 mbyte).

The Hard Disk unit was incorporated towards the end of software development when the memory requirements of COMPIC clearly made the use of floppy disks and single disk drives impractical.

Please note however, it is not anticipated that all COMPIC pictograph users will need to purchase the equipment and produce their own materials. Access to materials is readily available through the COMPIC Development Association.

(3) Defining the clinical needs of users and applications of the pictographs, and setting parameters for the design of the pictographs.

The considerable clinical experience of the committee members and networks represented by the membership, enabled definition of applications of a pictograph set which would primarily be used by people with severe communication impairment. These applications such as:

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. a wide range of communication materials, e.g. communication boards and teaching materials, e.g. books, flash cards and games, were identified as likely ways that the materials would be adapted by users in classrooms and clinical settings.

Due to the restrictions in time and resources, it was agreed that the pictographs for Phase I would be limited to a basic vocabulary set and 600 items were agreed upon.

Choice of an appropriate lexicon was a mammoth task. The literature was reviewed and initial selections were based on criteria suggested by Blau (1983), Carlson (1981), Fristow and Lloyd (1984), Lahey (1977), Wilson (1980) and the Makaton Vocabulary (Cooney, Cowley and Knox - 1984). As the lexicon assumed a developmental character, input was given by speech pathologists working in the adolescent and adult area. Overall there is something of a developmental bias to the lexicon and it is hoped that the second stage lexicon will be a more broadly based one.

This bias exists mainly because of the need to ensure that the initial COMPIC lexicon matches initial expressive lexicon needs as outlined in the literature. However, it is balanced by considerations that vocabulary items required by people using a very basic augmentative communication device, differ from developing spoken speech in young children.

Other factors relating to clinical applications, which were considered at this time, included colour coding and word/pictograph placement.

Colour coding:
It was decided to accept the concept that colour coding of vocabulary items in a descriptive, grammatical breakdown, was at best,a useful teaching tool and at worst, a cueing system to enable clients easier recall of word location on their communication aids. The problem remained - did we colour the background of the pictograph? (As in Blissymbolics, Cates and McNaughton 1975, and P.C.S. Johnson 1981). Did we colour in the pictograph itself or did we simply colour the outline of the pictograph? This is clearly an area for further research and it is hoped that in the future there will be clearer guidelines on how pictographs are most easily learned and used using colour coding. As the Hewlett Packard 7475 colour pen plotter was the plotter of choice, the choice was essentially made for us that the pictographs would be outlined in one of five colours. (The sixth pen in the plotter is a neutral one.) The question then remained, which colour would be assigned to which word class and why.
The review of the colour coding systems currently used, showed mainly that they all differed, however why or how colours have been chosen seemed to be intuitive and practical. Berlin and Kay (1969), two anthropologists, have documented that colour names form a hierarchy and are far from arbitrary in all language. That is, a two-colour term language uses black and white, a six-colour term language uses black, white, red, yellow, green and blue for the six colours it describes! Brown is next, and grey, orange, purple and pink are later less frequently used terms. The decision then to

be made was which word classes should be ascribed to particular colours. A brief review of systems around showed that the most frequent word classes were assigned the most frequently occurring colours. Our final decision did not relate to a theory base but a conflation of the number of colours available on the plotter and colour coding already in use. That is ....

. Noun - black
. Verbs - red
. Prepositions - blue
. Adjectives - green
. Adverbs - purple
. Wh questions/minor utterances - neutral
. Conjunctions/negation - brown.

We feel also that this is an area that should be research further.

Placement of the word:
Another area of discussion was placement of the printed word in relation to the pictograph. (Incidentally, fairly detailed modifications were required to enable the software to generate words alone rather than pictographs and words.) We attempted to contact Blissymbolics concerning their rationale of placement of the word above the pictograph rather than below. We received no response and consequently proceeded with the system we already used - the word below position. We have not located any research on which style might be more appropriate and would be interested to investigate this further.

(4) Designing and Transferring the Pictographs onto Disk:

Following the definition of the lexicon and identification of initial design considerations, specific design of the pictographs commenced. The process was a lengthy one whereby the graphic designer drafted 20-30 pictographs per month and presented them to the committee for acceptance.

Pictographs were designed, taking a number of factors into consideration. The first major requirement was the ability of users to guess the meaning of the pictographs. Pictographs were needed which visually resembled the concept or object whilst remaining perceptually simple. Psychologist (and linguists) refer to distinctive features of concepts or objects, that is, those uniquely identifiable bundle of properties which distinguish one item or action from another. The graphic designer attempted to enhance the distinctive features and eliminate the non-distinctive features in the pictograph set. Most pictographs were designed as linear and two-dimensional items, (exceptions are piano, letter-box and cake) with a minimum of lines for clarity, disability and speed of plotting.

Another important design feature was that pictographs were to be based on International Symbol Convention. This meant that COMPIC pictographs would closely resemble the type of pictographs/symbols seen by the general public, e.g. in airports, service stations and road signs. The rationale for this was the acceptability of the pictographs to both the communication aid user and to potentially naive listeners.

Pictographs were developed which were non-stereotyped, either in terms of gender or disability. The graphic designer felt that in some circumstances the guessability would be enhanced by using gender-defined figures, e.g. female nurse/male doctor. The issue was addressed by the development of a neutral figure to overcome the sex stereotyping of certain pictographs. Further, the neutral figure was added to a number of pictographs to enhance the distinctive features of the referent, e.g. bean bag, walking frame.

The pictographs were designed, using a standardized layout. Formalized design features were used to allow standardization of individual pictographs within semantic categories. (e.g. house, hospital, school, etc.) It also enabled guidelines to be developed for the creation of new pictographs.

(5) Writing the Software to Access and Manipulate the Pictographs in a Variety of Sizes, Colours and Configurations:

The pictographs used in COMPIC were created using the ROBOCOM Computer Assisted Drafting System which consists of a sophisticated software package and high quality hardware. Although this level of complexity was necessary for the production of the pictographs, it is not necessary for the delivery of them for every day use. Further more, it was thought that the prospect of learning to use such a sophisticated product as the ROBOCOM System would be rather daunting to most users, as well as being unnecessary, since the output from COMPIC is largely predefined.

The COMPIC delivery software has been designed to plot pictographs for communication and teaching purposes. Each of these can be plotted in a number of different predetermined sizes and formats on either A3 or A4 paper. The COMPIC software provides pictographs in four different sizes which can be plotted out in three different ways, in five colours.

The individual pictograph frame sizes are:

. 28 mm x 21 mm
. 36 mm x 27 mm
. 40 mm x 30 mm
. 120 mm x 90 mm

The three ways pictographs can be plotted are:

(i) as a grid pattern (commonly used for communication boards);

(ii) as a strip or line of pictographs (commonly used for communication board additions, sentence strips for teaching and books, and book translations for non-readers);

(iii) as single pictographs (commonly used for communication board additions and modifications and for teaching aids).

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Pictographs can also be displayed on the video display unit. Also included is the ability to store and to edit a description of each client's communication board, so that a new version of the communication board can easily be produced as needed.

The software has been designed to be as easy as possible to use so that very little user training will be required and so that infrequent users will have no difficulty in remembering how to use it. The user is presented with menus on the visual display unit and asked to select from a number of options, e.g. which format is required for a communication board. Explanations are displayed on the screen to assist in making choices and invalid responses are not accepted by the program.

(6) Writing and Producing a Manual:

A manual was written as the basic tool for all users of the COMPIC system. There are two versions of the manual available. One for users of the pictographs only and one for users of the software.

The manual includes areas such as:

. COMPIC description,
. COMPIC applications - who might use COMPIC,
. How to create the non-speech aid,
. Teaching hints and strategies,
. COMPIC lexicon and COMPIC dictionary.

(7) Identifying Additional Standardized Materials Required:

During the production of the manual, the need to produce a readily available dictionary in at least one other size was identified.

An additional manual of teaching cards, printed on cardboard, was produced as this size is likely to be required in many learning situations.

(8) Setting Up the Software into Supported Employment Facilities:

The production of individualised materials is conducted by people with disabilities - to provide a stimulating, "high-tech" employment option for employees. People with severe disabilities and communication disabilities benefit from the provision of this vocational option. Until recently it was difficult to provide appropriate jobs for people with intellectual capabilities but with physical limitations in supported work units. Technology has now been applied to address the situation. COMPIC is currently set up at two supported work units.

(9) Setting Up an Effective Information, Contact and Distribution Service:

To fulfill the third major aim of increasing availability of materials, some form of publicity and distribution has been required.

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Much of this information distribution has been via word of mouth or through training/inservice sessions, as the speech pathologists on the committee are known as key resource people in Victoria for the area of severe communication impairment. Contact of any sort with the COMPIC Development Association results in placement on a mailing list so that information is disseminated as it comes to hand. Distribution of the materials has been co-ordinated initially by Yooralla Society representatives with minimal support from other committee members. COMPIC Development Association is a non-profit group, commited to enhancing communication and learning potential of people who have a severe communication disability, and who are pre-readers or non-readers.

COMPIC Phase II:

COMPIC is an ongoing project - particularly with regard to the distribution of communication and teaching materials.

With the continuation of the project, a number of different needs were identified. These have formed the objectives for Phase II of the project and will be discussed individually.

(1) Development of Computer Assisted Software:

Phase II has seen the development of software for teaching purposes using the current COMPIC pictographs. The software is available as "umbrella software" and has been designed for use with the Apple IIe and IIc computers. The programs include COMPIC pictograph matching tasks, pictograph and word-matching tasks, and jumbled sentences using COMPIC pictographs - with the potential for using a personalized vocabulary.

(2) The Incorporation of the COMPIC Development Association:

The COMPIC committee was confronted with the problem that this computerised publishing system meant financial considerations. It was necessary to borrow money for the printing of manuals and the advertising and distribution of materials. This led to the COMPIC Development Association becoming an incorporated body.

This incorporated body is a non-profit group who will use income to generate further developments. Any person/s purchasing a manual from COMPIC Development Association becomes eligible for membership with the COMPIC Development Association Inc. There is also an associate membership available for people who pay a joining fee but who have not purchased materials.

People who join the association are eligible for updated information on the resources available. Members will also be given the opportunity to make suggestions for improving the system - particularly with ideas for new vocabulary items and modifications to existing programs.

(3) Expansion of the Pictograph Vocabulary:

Currently the key objective for Phase II of the COMPIC project is an expansion of the size of the vocabulary. The 580 pictographs currently available in the existing set cover only basic communication needs. It was recognised that at least double this

number of pictographs was needed for a viable communication system. The current 580 pictographs also have a bias towards a school aged communication user and it is hoped that this imbalance can be corrected with the expansion in the Stage II vocabulary.

Funding for Phase II of the project was sought through the philanthropic trusts. The funding was more successful than expected and currently a graphic designer is employed to modify some of the existing pictographs and should draw the new pictographs. The graphic design artist is working within the design guidelines which were developed for the creation of the Phase I vocabulary set. This is to maintain the clarity, consistency and ease of reproduction of the pictographs.

(4) Availability of Self-Adhesive Materials:

Funding from the philanthropic trusts is also being used to produce sheets of appropriately sized "stickers". The availability of self-adhesive materials will lessen the time consuming task of cutting and pasting the pictographs. Self-adhesive materials will be available for the four different sizes of pictographs that are currently used.

(5) Up-Grading the COMPIC Software to Increase Speed and Enable Compatibility with Other Micro/Personal Computers:

Again, with philanthropic trust funds, a computer programmer is upgrading the COMPIC software. Modifications to the software program will make the system faster and also compatible with the IBM personal computer.

(6) Plotter/Printer

The Hewlett-Packard 7475 Colour Pen Plotter is under review and it has been decided by the graphic designer that the new paint-jet printers will produce a sufficiently improved product.

Further funding will be required for this area.

(7) It is increasingly obvious that packaging of COMPIC materials is requiring modification because as the materials expand, the nature of presentation alters. For example, 580 teaching card size pictographs fit into a large plastic folder moderately well but 1180 pictographs will not fit nearly so elegantly.

Further funding will be sought for this work.

The COMPIC Project continues to be a dynamic and far-sighted scheme. It aims to make high quality communication and teaching materials available at reasonable prices. Objectives for Phase III of the project are soon to be formulated.

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COMPIC - Stage 2

COMPIC is an acronym formed from "Computer Pictographs for Communication". COMPIC is a computerised publishing system which produces low-cost, customised communication aids and teaching materials. Stages 1 and 2 of the COMPIC project have been successfully completed. This has included the incorporation of the COMPIC Development Association, the development of over 1000 pictographs available as customised layouts in various sizes, colours and with or without adhesive backing ; the publishing of sets of teaching cards and a manual to accompany the system ; and modifications to the software to ensure speed and compatablity with the Apple IIe , the Apple II GS , the IBM PC and IBM compatables.
Input from COMPIC Development Association members was sought for any additions or modifications to the pictograph vocabulary.
This paper aims to provide a background to the project, an update on the current developments and an idea of the future directions of the COMPIC Development Association.

Karen Bloomberg (on behalf of the COMPIC Development Association)